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Technique for Depositing Silicon Dioxide on Indium Arsenide Improves Adhesion

This technique improves the adhesion of a silicon dioxide (SiO_2) film on an indium arsenide (InAs) surface, and should interest industrial organizations producing photodiode arrays and related electronic devices. The bonding method was evaluated in an oxygen plasma atmosphere for room temperature glow discharge deposition of SiO_2 , but not for other SiO_2 deposition techniques (see ref. at end of text).

Earlier known methods achieved surface passivation of InAs by depositing the SiO_2 directly on the InAs surface. These deposited oxides adhered poorly and cracked during thermal cycling, limiting the film thickness. The improved technique permits good adhesion and is resistant to cracking.

Preparing InAs for planar array techniques involves slicing an N-type InAs boule (ingot) into wafers. Each wafer contains two faces, A and B. After cleaning, the faces are polished parallel, and the B-face is optically and chemically polished to a highly reflective scratch-free surface using an alumina-bromine-methanol chemical polish.

In planar array processing, the InAs wafer is diced into a prescribed geometry, then cleaned and dried. Pre-oxidizing the wafer in an oxygen atmosphere at 500°C for ten minutes then forms an oxide interface between the SiO_2 passivation layer and the InAs surface. A very strong bond results between the InAs and the SiO_2 .

Reference:

Ing and Davern: Glow Discharge Formation of Silicon Oxide and the Deposition of Silicon Oxide Thin Film Capacitors by Glow Discharge Technique. J. Electromech. Soc., vol. 112, no. 3. Mar. 1965

Note:

The following documentation may be obtained from:

Clearinghouse for Federal Scientific
and Technical Information
Springfield, Virginia 22151
Single document price \$3.00
(or microfiche \$0.65)

References:

NASA-CR-86039 (N68-19209), Solid State Image Sensor Research (Phase II)

NASA-CR-86231 (N69-36922), Solid State Image Sensor Research (Final Technical Report)

Patent status:

No patent action is contemplated by NASA.

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